भारतीय मानक
Indian Standard

IS 16015 : 2022

[*Superseding* IS 5930 : 1970
and IS 6607 : 1972]

मॉरटिस ताले और लैचेस (मैकेनिकली संचालित) — विशिष्टि

(पहला पुनरीक्षण)

Mortise Locks and Latches (Mechanically Operated) — Specification

(First Revision)

ICS 91.190

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Utensils, Cutlery Domestic Hardware Sectional Committee, MED 33

FOREWORD

This Indian Standard (First Revision) was adopted by the Bureau of Indian Standards, after the draft finalized by the Utensils, Cutlery and Domestic Hardware Sectional Committee had been approved by the Mechanical Engineering Divisional Council.

This standard was first published in 2013 after superseding IS 2209 : 1976 'Specification for mortice locks (vertical type)', IS 7540 : 1974 'Specification for mortice dead locks' and IS 8760 : 1978 'Specification for mortice sliding door locks, with lever mechanism'. In view of availability of new materials and new developments in this area, it has been proposed to review the existing standards and align them with International Standards. This standard lays down the requirements for mortice locks with lever mechanism (vertical type, sliding door locks and dead locks) which were earlier covered by the IS 16015 : 2013 'Mortice locks with lever mechanism (vertical type, sliding door locks and dead locks) — Specification', IS 5930 : 1970 'Specification for mortice latch (vertical type)' and IS 6607: 1972 'Specification for rebated mortice locks (vertical type)'.

After publication of this revised standard, IS 5930 : 1970 and IS 6607 : 1972 shall stands withdrawn.

In this revision the following major changes have been made:

a) Recommended material widely used for manufacture of locks, latches and its component has been prescribed for guidance;
b) Typical designs of the locks have been prescribed:
c) Grades of the lock (that is, grade 1, grade 2 and grade 3) have been prescribed based on the usage;
d) Non interchangeability of keys for the packing of lock has been prescribed;
e) New test for checking the strength of the key has been introduced;
f) New tests for locking plate have been added; and
g) Marking clause has been modified.

The information to be supplied by the purchaser when placing an order for supply of mortice locks shall be as per Annex A.

This standard has been prepared to give guidance to manufacturers and users in getting a product of good performance. Wherever word 'mortice lock' is appearing shall be read as 'mortice lock and latch'

The composition of the committee responsible for the formulation of this standard is given in Annex D.

The relevant SI units and corresponding conversion factors are given below for guidance:

Pressure 1Pa (Pascal) = 1 N/m^2
1 kgf/mm^2 = 9.806 65 MPa

For the purpose of deciding whether a particular requirement of this standard is complied with the final value, observed or calculated, expressing the result of a test or analysis shall be rounded off in accordance with IS 2 : 2022 'Rules for rounding off numerical values (*second revision*)'. The number of significant places retained in the rounded off value should be the same as that of the specified value in this standard.

Indian Standard

MORTISE LOCKS AND LATCHES (MECHANICALLY OPERATED) — SPECIFICATION

(First Revision)

1 SCOPE

1.1 This standard specifies requirements and test methods for durability, strength, security and function of mechanically operated locks and latches and their locking plates for use in doors, window doors and entrance doors in buildings.

1.2 The following locking devices and associated products are not covered by this standard:

a) cylinders for locks, handles;
b) electro-mechanically operated locks and striking plates;
c) multi-point locks and their locking plates;
d) locks for windows, padlocks; and
e) locks for safes, furniture locks and prison locks.

2 REFERENCES

The standards listed below contain provisions which, through reference in this text constitute provisions of this standard. At the time of publication, the editions were valid. All standards are subject to revision, and parties to agreements based on this standard are encouraged to investigate the possibility of applying the most recent editions of the standards indicated below:

IS No	*Title*
210 : 2009	Grey iron castings — Specification (*fifth revision*)
292 : 1983	Specification for leaded brass ingots and castings (*second revision*)
318 : 1981	Specification for leaded tin bronze ingots and castings (*second revision*)
319 : 2007	Free cutting brass bars, rods and section — Specification (*fifth revision*)
410 : 1977	Specification for cold rolled brass sheet, strip and foil (*third revision*)
617 : 1994	Cast aluminium and aluminium alloy — Ingots and castings for general engineering purposes — Specification (*third revision*)
737 : 2008	Wrought aluminium and aluminium alloy sheet and strip for general engineering purposes — Specification (*fourth revision*)
742 : 1981	Specification for zinc base alloy die castings (*second revision*)
1079 : 2017	Hot rolled carbon steel sheet, plate and Strip — Specification (*seventh revision*)
1573 : 1986	Specification for electroplated coatings of zinc on iron and steel (*second revision*)
4454 (Part 1) : 2001	Steel wires for mechanical springs — Specification: Part 1 Cold drawn unalloyed steel wire (*third revision*)
4454 (Part 4) : 2001	Steel wires for mechanical springs: Part 4 Stainless steel wire (*second revision*)
6911 : 2017	Stainless steel plate, sheet and strip — Specification (*second revision*)
7608 : 1987	Specification for phosphor bronze wires for general engineering purposes (*first revision*)
7881 (Part 1) : 1975	Glossary of terms relating to building hardware: Part 1 Locks
9844 : 1981	Methods of testing corrosion resistance of electroplated and anodized aluminium coatings by neutral salt spray test
14329 : 1995	Malleable iron castings — Specification

3 SIZE

3.1 The widely used sizes of mortise locks are given below:

65 mm, 75 mm, 100 mm, 125 mm and 150 mm.

3.1.1 The size of the lock shall be denoted by the overall length of the body measured from the outside face of the fore-end to the rear end. The measured length shall not vary more than ± 3 mm from the length specified for the size.

3.2 Mortise locks of sizes other than those specified in **3.1** may be supplied as per agreement to between the manufacturer and the purchaser.

NOTE — The tolerances applicable (size, performance test etc.) on such locks shall be same as specified in this standard.

4 MATERIAL

4.1 The material widely used for manufacturing of various components/parts of locks and latches are given in Table 1 (for guidance only).

4.2 The material grades widely used for manufacturing of various components/parts of locks and latches are given in Table 2 (for guidance only). The manufacturer shall declare the material used for various components/parts of locks and latches.

5 SHAPE

5.1 The shape, design and mechanism of mortise locks and latches and its component parts indicated in Fig. 1 to Fig. 10 are illustrative only. The manufacturer may make mortise locks and latches of other shapes to suit his design.

6 TERMS, DEFINITIONS, SYMBOLS AND UNITS

6.1 Terms and Definitions

For the purpose of this standard, the following definitions in addition to given in IS 7881 (Part 1) shall apply.

Table 1 Materials for Various Component Parts of Mortise Locks and Latch

(*Clause* 4.1)

Sl No. (1)	Components (2)	Mild Steel (3)	Cast Brass (4)	Brass Sheet (5)	Aluminium Alloy Sheet (6)	Zinc base Alloy Die Casting (7)	Stainless Steel (8)
i)	Lock body	Yes	–	Yes	–	–	Yes
ii)	Forend plate	Yes	–	Yes	–	–	Yes
iii)	Latch/dead bolt	–	Yes	–	Yes	Yes	Yes
iv)	Hook bolt	Yes	Yes	–	–	–	Yes
v)	Follower	–	Yes	–	–	Yes	–
vi)	Keys	Yes	Yes	–	–	Yes	–

Table 2 Recommended Materials Grades for Mortise Locks and Latches

(*Clause* 4.2)

Sl No. (1)	Material (2)	Suitable Grades (3)
i)	Mild steel	Any suitable grade as per IS 1079
ii)	Cast iron	FG 300 of IS 210
iii)	Malleable iron	BM 300, BM 320, BM 350 of IS 14329
iv)	Cast brass	Any suitable grade of IS 292
v)	Brass sheet	Any suitable grade of IS 410
vi)	Extruded brass	Any suitable grade of IS 319
vii)	Aluminium alloy pressure die casting	Any suitable grade of IS 617
viii)	Aluminium alloy sheet	Any suitable grade of IS 737
ix)	Leaded tin bronze	LTB 1, LTB 2 and LTB 3 of IS 318
x)	Zinc base alloy die casting	Any suitable grade of IS 742
xi)	Phosphor bronze wire	Any suitable grade as per IS 7608
xii)	Spring steel wire	Any suitable grade of IS 4454 (Part 1), can be round or strip as per IS 4454 (Part4).
xiii)	Stainless steel	Any suitable grade of IS 6911
xiv)	Zinc plating on steel	Any suitable grade of IS 1573

6.1.1 *Bolt*

Movable part of a lock or latch that usually engages a component fixed to a frame and withdraws into the case.

6.1.2 *Backset of Lock*

Length measured from the outside face of fore end to center of key hole.

6.1.3 *Case*

Part of lock in which the lock mechanism and/or latch action is housed.

6.1.4 *Center Distance*

Length measured from the center of follower to center of keyhole.

6.1.5 *Deadbolt*

Bolt that is operated in both directions by a key, handle and/or thumb turn.

6.1.6 *Detaining Element*

Part of movable member which is move by the key into a predetermined position in order for the bolt to be able to move into an opening position.

6.1.7 *Differ*

Variation between lock mechanisms of similar design, achieved by the detaining elements, which allows each lock to be operated only by its own key.

6.1.8 *Effective Differ*

Difference between lock or key recognition systems of similar design achieved only by the detaining elements which allows each lock or key recognition systems to be operated only by its own key. The number of effective differ is equal to the number of theoretical differs after deduction of differs suppressed by the manufacturer due to technical constrains.

6.1.9 *Follower*

Part of a lock that operates the bolt or bolts when turned by a spindle.

6.1.10 *Forend*

Part of a case through which the lock is fixed to the door and through which the latch bolt and/or deadbolt pass.

6.1.11 *Hook Bolt*

Bolt that is operated in both directions by a key which swivels and hooks into locking plate.

6.1.12 *Key*

Device that is removed and portable and is used to operate the lock or latch.

6.1.13 *Latch*

Self engaging fastener which secures a movable component (for example, door) in a closed position and which can be released by hand.

6.1.14 *Latch Action*

Arrangement and performance of the constituent parts that operate a latch bolt.

6.1.15 *Latch Bolt*

Moving part of the latch engages the locking plate.

6.1.16 *Lock*

Fastener which secures a movable component in a closed position within an opening and which is operated by a key or other devices.

6.1.17 *Locking Plate*

Component fixed to a frame to engage a bolt, or bolts.

6.1.18 *Locking Snib*

Device, usually in the form of a small lever or knob, which can be operated to prevent the bolt from being thrown or withdrawn, or to change the function of a lock or latch.

6.1.19 *Lock Mechanism*

Constituent parts of a lock that operates the deadbolt and, where required, provide the differs.

6.1.20 *Lockset*

Length measured from outside face of forend to end of lock body.

6.1.21 *Rebated Forend*

Part of case which is profiled to suit rebated doors and act as forend through which the lock is fixed to the door and through which the latch bolt and/or deadbolt pass.

6.1.22 *Size of Lock*

Overall vertical length of a lock case.

6.2 Symbols, Units and Abbreviated Terms

For the purpose of this standards, the following symbols shown in Table 3 and Fig. 1.

Table 3 Symbols

(*Clause* 6.2)

Sl No. (1)	Symbol Test Parameter (2)	Definition (3)	Unit (4)
i)	F1	Lateral force on latch bolt (strength test)	kN
ii)	F2	Return force of latch bolt	N
iii)	F4	Lateral force on dead bolt and locking plate	kN
iv)	F5	End load on dead bolt	kN
v)	F6	Pull force on hook/claw bolt	kN
vi)	F7	Disengaging force on hook/claw	kN
vii)	F8	Force on locating device or lifting force on locking plate	kN
viii)	L1	Deadbolt projection [a)]	mm
ix)	L2	Resulting projection [a)]	mm
x)	M1	Torque to withdraw the latch bolt with key	Nm
xi)	M2	Torque to withdraw the latch bolt with handle, spring handle or knob	Nm
xii)	M3	Torque to operate the deadbolt with key	Nm
xiii)	M4	Forcing torque on the follower	Nm
xiv)	M5	Torque on key	Nm
xv)	N1	Number of detaining elements	–
xvi)	N2	Number of effective differs	–
xvii)	N3	Number of step heights on key	–

[a)] *See* Fig. 12

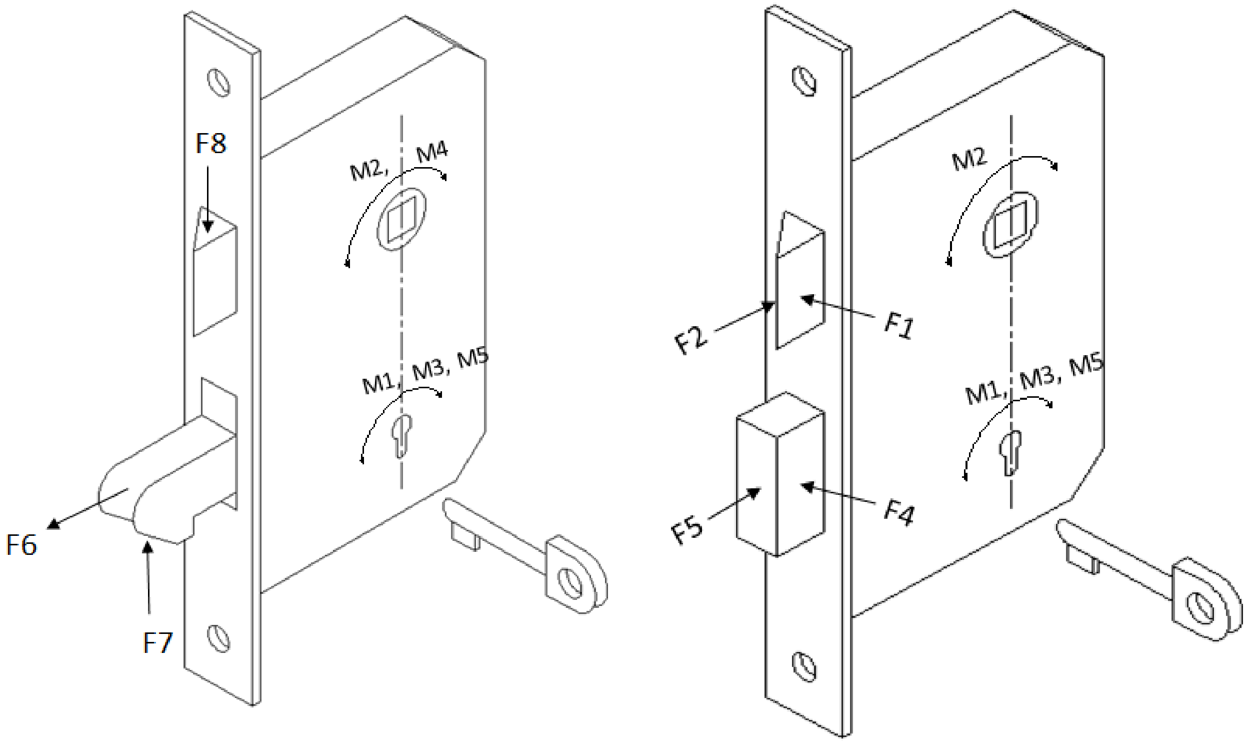
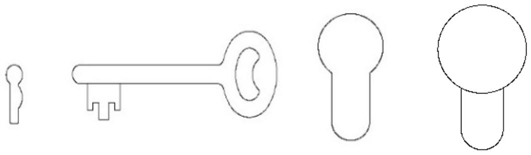


FIG. 1 APPLICATION OF FORCES AND TORQUES TO LOCKS AND LATCHES CLASSIFICATION

7 DESIGNS OF LOCKS

7.1 Technologies (Shapes)

Some common types of Mortise locks are as follows (*see* Fig. 2):



Lever Profile with Key Euro Profile Swiss Profile

FIG. 2 TYPICAL DESIGN OF VARIOUS TECHNOLOGIES

7.1.1 *Lever Profile with Key*

7.1.2 *Euro Profile*

7.1.3 *Swiss Profile*

7.2 Types of Locks with Locking Mechanisms

Various locking mechanisms used for Mortise locks and latches are given in **7.2.1** to **7.2.8**.

7.2.1 *Mortise Lock with Latch Bolt* (*see* Fig. 3)

7.2.2 *Mortise Lock with Dead Bolt* (*see* Fig. 4)

7.2.3 *Mortise Lock with Latch Bolt and Dead Bolt* (*see* Fig. 5)

7.2.4 *Mortise Lock with Hook Bolt* (*see* Fig. 6)

7.2.5 *Mortise Lock with Latch Bolt and Hook Bolt* (*see* Fig. 7)

7.2.6 *Mortise Lock with Dead Bolt and Hook Bolt* (*see* Fig. 8)

7.2.7 *Mortise Lock with Dead Bolt and Latch Bolt for Keyless application* (*see* Fig. 9)

7.2.8 *Mortise Lock with Latch Bolt and Dead Bolt for Rebated (Double) Doors* (*see* Fig. 10)

8 CATEGORY OF USE (GRADE OF LOCKS)

8.1 Three grades are identified in accordance with requirements are given below:

8.1.1 *Grade* 1 (*Low Security*) — For use by people with a high incentive to exercise care and with a small chance of misuse, for example, residential doors.

8.1.2 *Grade 2* (*Medium Security*) — For use by people with some incentive to exercise care but where there is some chance of misuse, for example, office doors.

8.1.3 *Grade 3* (*High Security*) — For use by the public where there is little incentive to exercise care and where there is a high chance of misuse, for example, doors in public buildings.

9 PERFORMANCE TESTS

9.1 General

9.1.1 Throughout this standard, the following tolerances shall apply, unless otherwise stated.

a) Mass, in kilograms (kg or g) : ± 2 percent
b) Length, in millimeter (mm) : ± 2 percent
c) Force in kilonewton or newton (kN or N) : ± 2 percent
d) Torque, in newton meter (Nm) : ± 2 percent
e) Time, in second (s) : ± 2 percent
f) Temperature, (in ºC) : ± 2 percent

9.1.2 Unless otherwise stated, force shall be applied and raised to the required level within 60 ± 10 s and shall be held there for 60 ± 5 s. Please refer Annex B for all typical test apparatus.

9.2 Key Identification Requirement

9.2.1 *Detaining Elements (N1)*

The minimum number of detaining elements (N1) that form part of the deadbolt mechanism (or latch action where there is direct operation by the key) shall be as specified in Table 4.

9.2.2 *Effective Differ (N2)*

Assessed with reference to the manufacturer's differs chart and/or to supporting documentation, lock shall have the minimum number of effective differ (N2) that are indicated in Table 4.

9.2.3 *Differing Step Heights on Key (N3)*

Assessed with reference to the manufacturer's differs chart and/or to supporting documentation, key shall have the minimum number of different step heights (N3) as given in Table 4.

9.2.4 *Non-inter Passing of Keys with Just One Interval Differ*

When tested with the next closest keys (that is those differing from the correct key by one interval up or down in any one step position), as defined by the manufacturer's coding system, using an applied torque on the key of 2.5 Nm, it shall not be possible to open the lock with the next closest key.

9.2.5 *Non-interchangeability*

The locks shall be packed to have non-interchangeability keys in a batch consisting of 25 locks. In case non-interchangeability in a higher number is required, it shall be as per agreement to between the manufacturer and the purchaser.

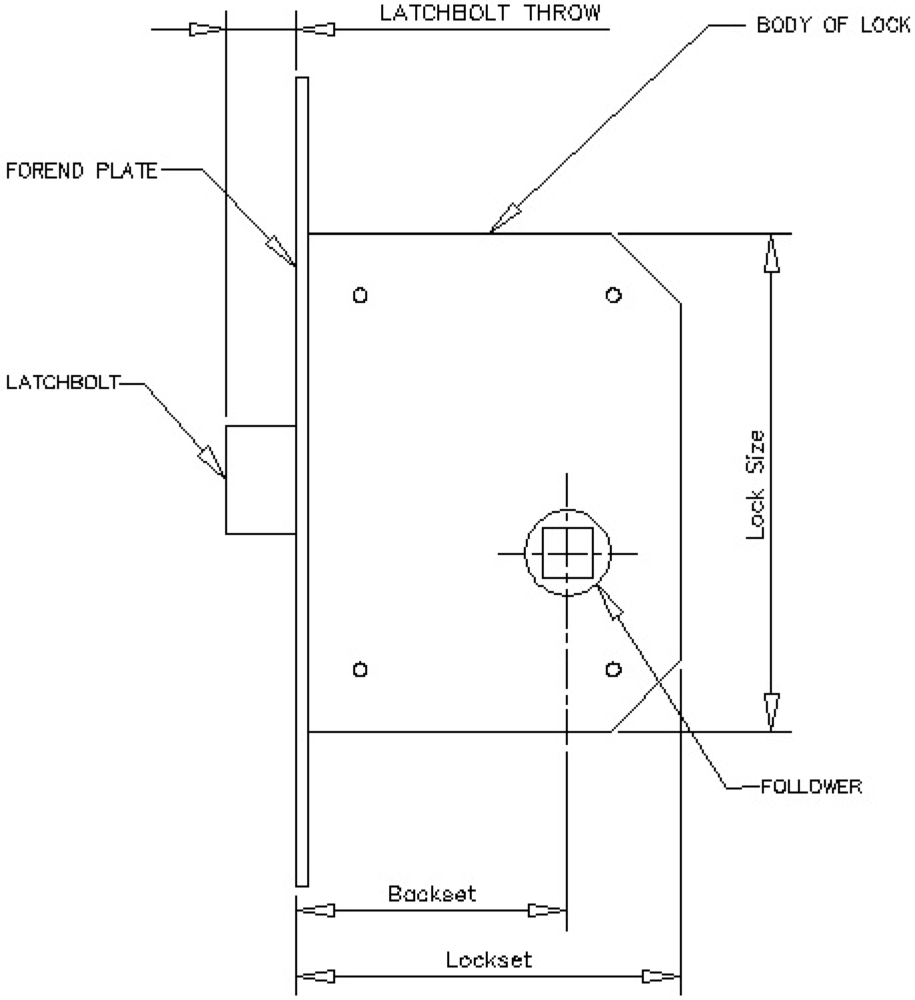


FIG. 3 TYPICAL DESIGN OF MORTISE LOCK WITH LATCHBOLT

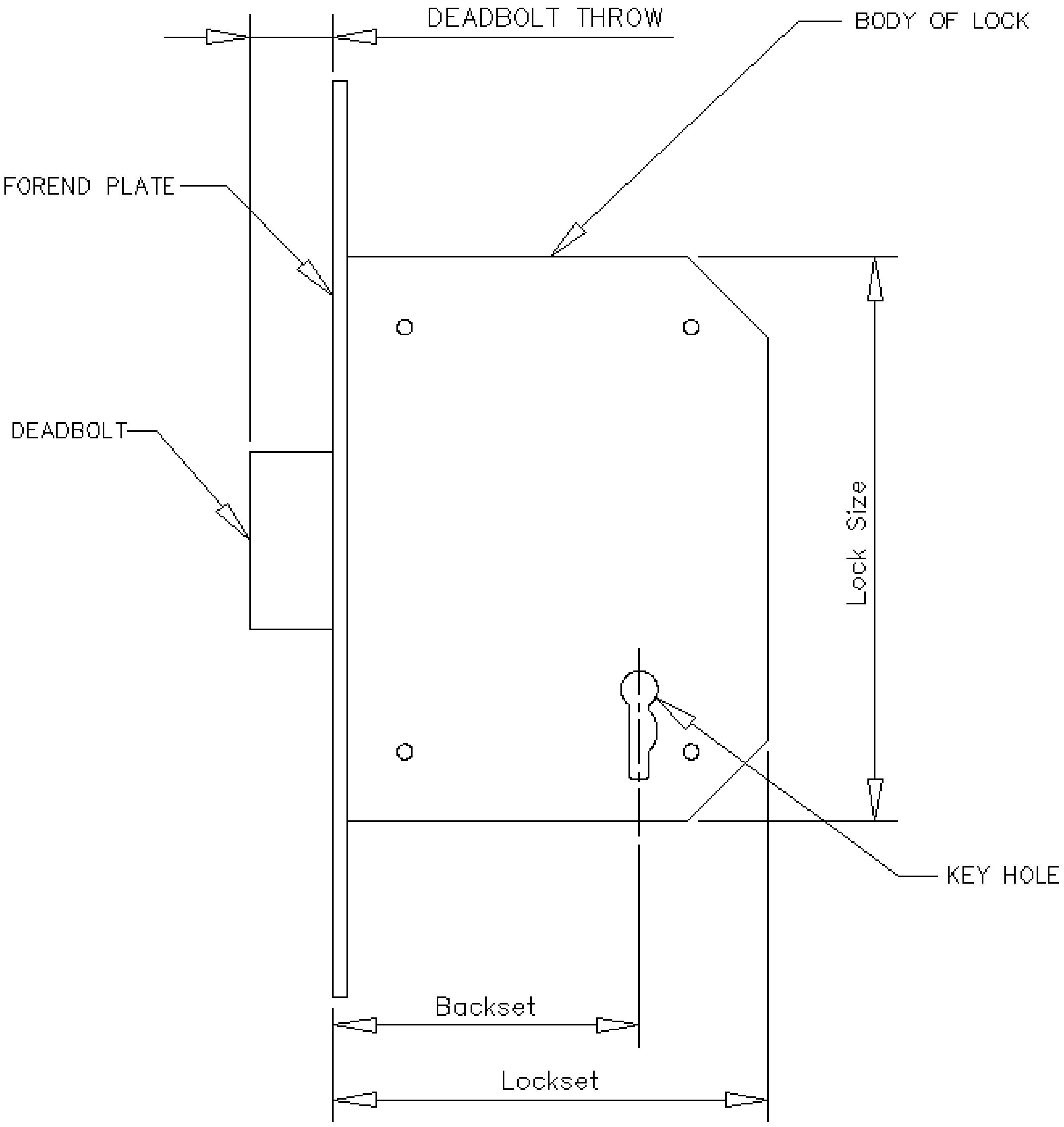


Fig. 4 Typical Design of Mortise Lock with Deadbolt

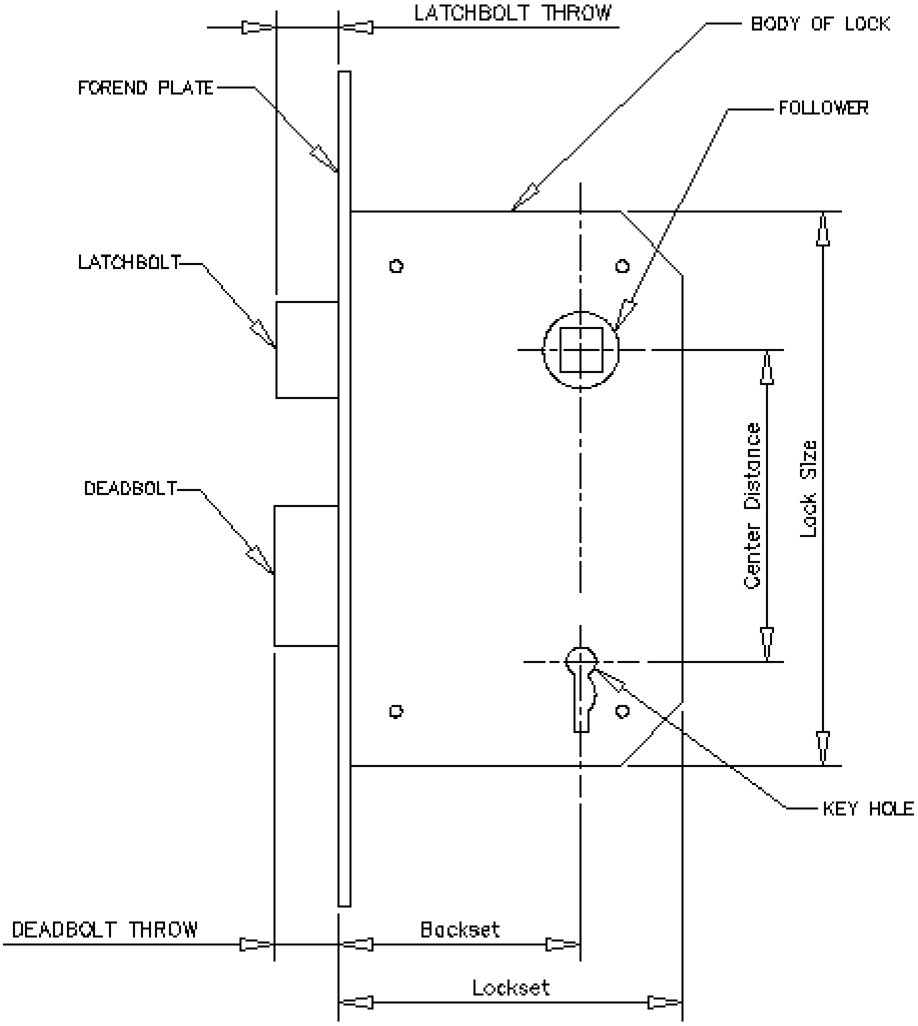


FIG. 5 TYPICAL DESIGN OF MORTISE LOCK WITH LATCHBOLT AND DEADBOLT

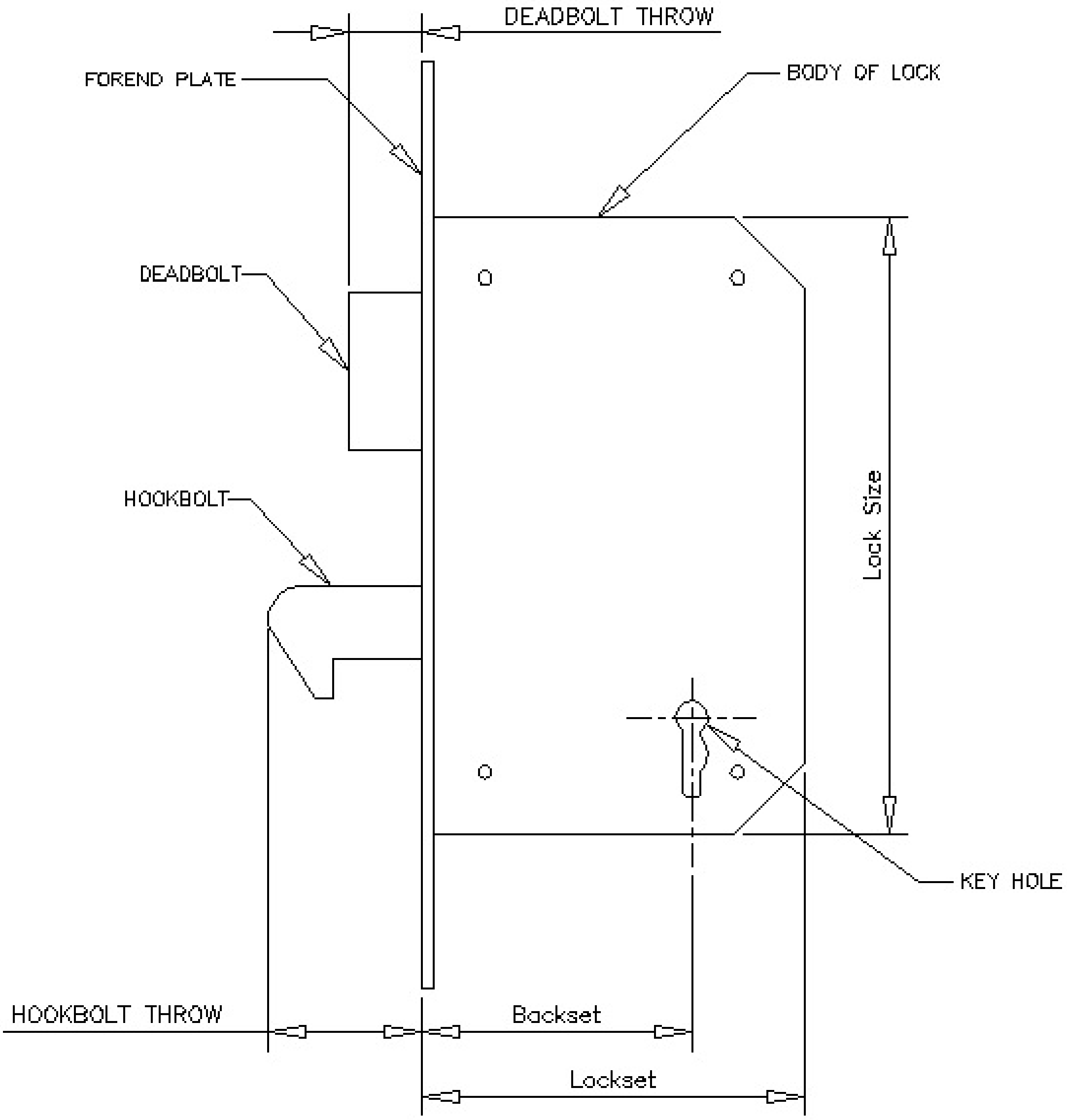


Fig. 6 Typical Design of Mortise Lock with Hookbolt

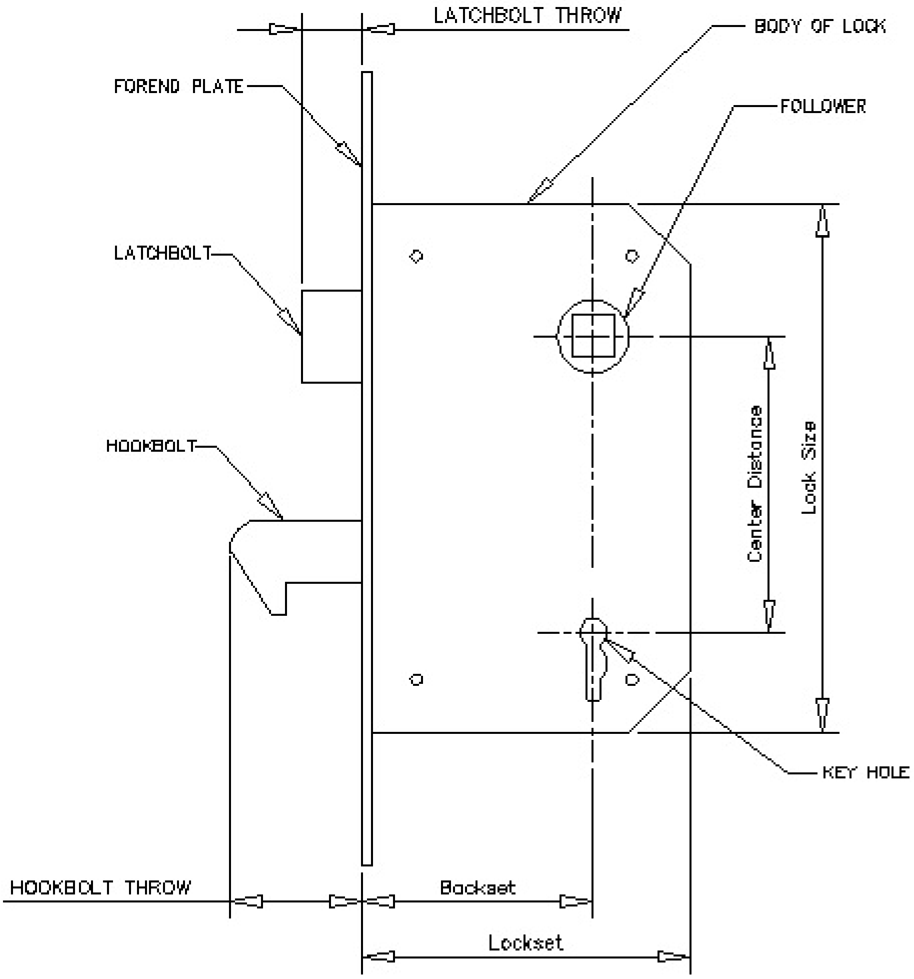


FIG. 7 TYPICAL DESIGN OF MORTISE LOCK WITH LATCHBOLT AND HOOKBOLT

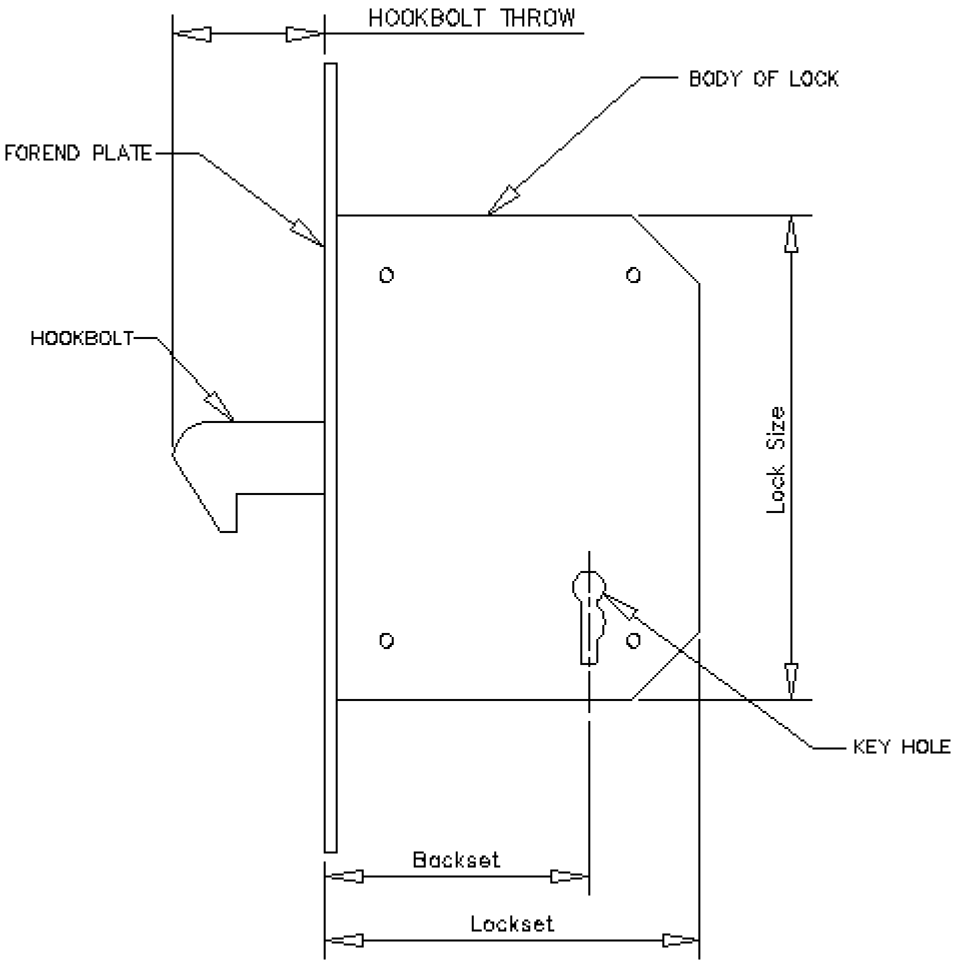


FIG. 8 TYPICAL DESIGN OF MORTISE LOCK WITH DEADBOLT AND HOOKBOLT

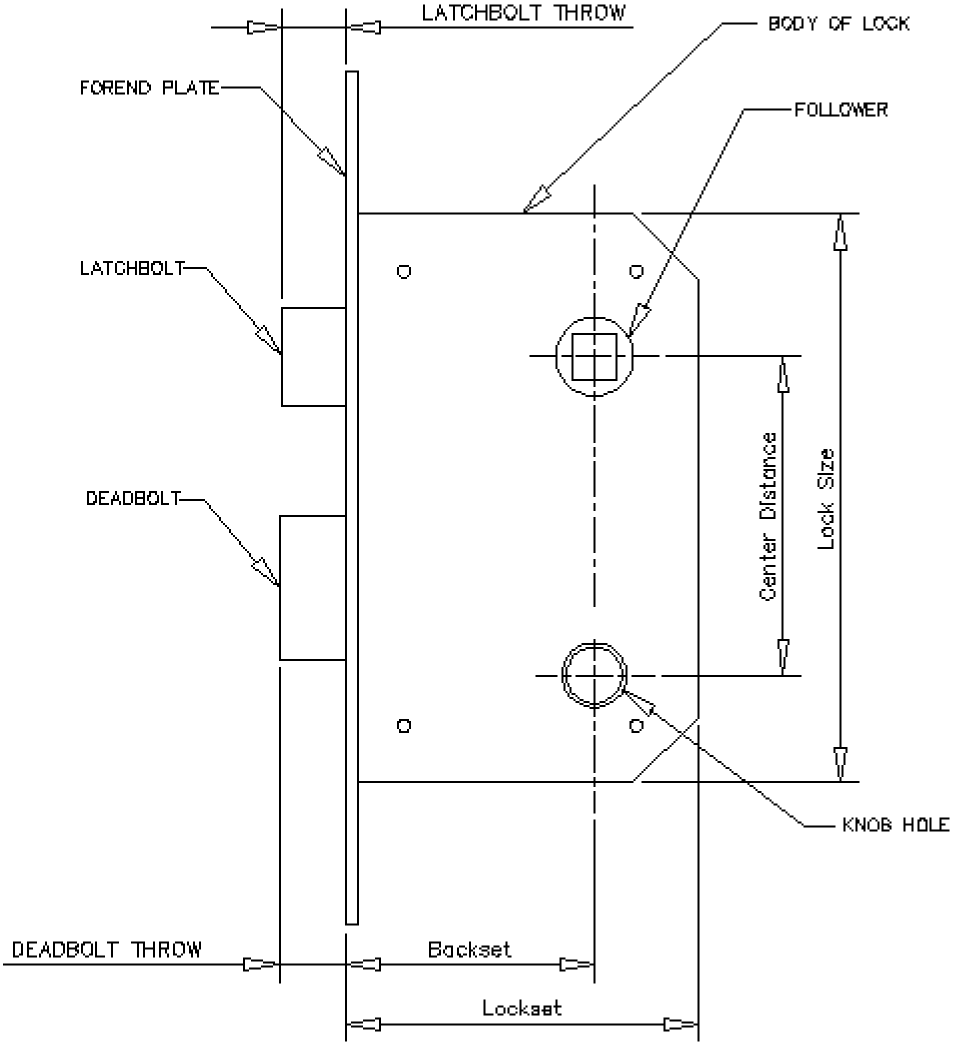


FIG. 9 TYPICAL DESIGN OF MORTISE LOCK FOR KEYLESS APPLICATION (PRIVACY FUNCTION)

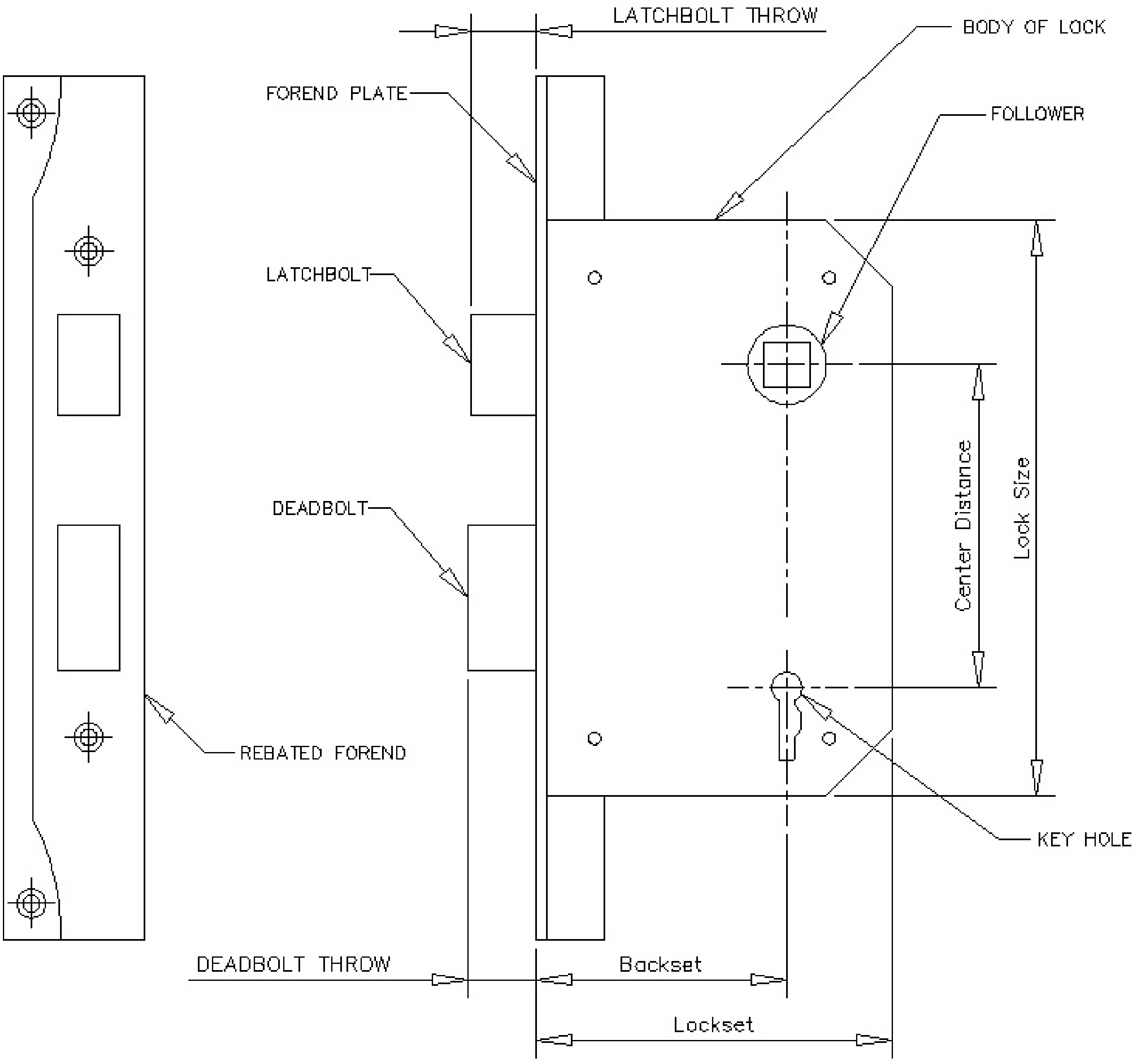


FIG. 10 TYPICAL DESIGN OF MORTISE LOCK FOR REBATED (DOUBLE) DOORS

Table 4 Key Identification Requirement

(*Clauses* 9.2.1, 9.2.2 *and* 9.2.3)

Sl No. (1)	Grade (2)	Minimum Number of Detaining Elements, (N1) (3)	Locking Sides (4)	Minimum Number of Effective Differs, (N2) (5)	Minimum Number of Differing Step Height on Key, (N3) (6)	Non-inter passing of Key (7)
i)	1	2	Both	12	2	Yes
ii)	1	3	Both	25	2	Yes
iii)	2	4	Both	100	2	Yes
iv)	2	6	Both	100	3	Yes
v)	3	5	Both	1 000	3	Yes
vi)	3	7	Both	1 000	4	Yes
vii)	3	6	Single	20 000	3	Yes
viii)	3	7	Single	40 000	4	Yes

9.3 The finally assembled lock shall withstand the performance tests as given in **9.3.1**, **9.3.2** and **9.3.3**.

9.3.1 *Tests for Dead bolt of Mortise Lock*

9.3.1.1 *Torque to operate deadbolt with key*

Using suitable torque gauge and key, the deadbolt shall be operated through the full range of movement, during which, the torque shall not exceed, M3 = 1.5 Nm. (*see* Fig. 1)

9.3.1.2 *Resistance to side load on deadbolt*

The lock or latch shall be mounted in a test apparatus as shown in Fig. 11 and a side load F4 shall be applied without shock in the direction perpendicular to securing face as well as on both the locking faces of protruding bolt in turn. Then the load shall be applied by means of a fixed steel tool 5 mm thick by a rounded edge (*see* Fig. 11c) held in such a position that the center line is approximately 3 mm ± 0.2 mm from the fore end. Where the application allows, load shall be applied to the deadbolt from both sides, tested on separate locks. The deadbolt should withstand load F4 as per Table 5.

9.3.1.3 *Resistance to end load on deadbolt*

The product shall be mounted in a test apparatus, as shown in Fig. 12 in which projection of the deadbolt can be measured. An end load F5 shall be applied to the deadbolt for a period of 60^{+10} s and the resulting projection be noted. If the lock is intended for use with a cylinder, a suitable cylinder or dummy cylinder shall be fitted for the test. The deadbolt should withstand load F5 as per Table 5.

9.3.1.4 *Resistance to pulling of hook/claw bolt*

The lock or latch shall be mounted in a suitable fixture as shown in Fig. 13, using metal thread screws of equivalent strength to the fixings supplied/recommended by the manufacturer, and a tensile force F6 applied to the forend for a period of 60 s +10 s. The hook/claw bolt should withstand load F6 as per Table 5.

9.3.1.5 *Resistance to disengaging of hook/claw bolt*

The lock or latch shall be mounted in a suitable fixture as shown in Fig. 13, using metal thread screws of equivalent strength to the fixing recommended/supplied by manufacturer and a force F7 applied 3 mm from the forend in the unlocking direction of the bolt as shown in Fig. 13b, for a period of 60 s +10 s. It is not necessary for the lock to be operable by key after the test. The hook/claw bolt should withstand load F7 as per Table 5.

NOTE — Where the bolt is protected by a box locking plate, the disengaging force requirement for grades 2 and 3 should be 2 kN.

9.3.1.6 *Resistance to forcing of locating device in sliding door locks*

The lock or latch shall be mounted in a suitable fixture as shown in Fig. 13, using metal thread screws of equivalent strength to the fixing recommended/supplied by manufacturer and a force F8 applied 3 mm from the forend in the locking direction of the bolt as shown in Fig. 13c, for a period of 60 s +10 s. The hook/claw bolt should withstand load F8 as per Table 5. The tests as given in **9.3.1.2** and **9.3.1.3** shall be repeated as per the frequency given below:

a) *Grade 1* — Every 12 months;
b) *Grade 2* — Every 6 months; and
c) *Grade 3* — Every 3 months.

NOTE — The repeat tests are not applicable for euro/oval profile cylinder bodies.

9.3.2 *Tests for Latch bolt of Mortise Lock*

9.3.2.1 *Latch action*

When the latch bolt is pressed into the lock body by pressure, the action shall be smooth and when fully pressed the latch bolt shall not project more than 1 mm from the face of the forend.

9.3.2.2 *Return force of latch bolt*

Using a suitable force F2 operating in the same plane of movement as the latch bolt, the latch bolt shall be depressed fully with the force gauge, then allowed to extend until the leading edge of the bolt head is 2 ± 0.5 mm from the face of the forend, at which point the return force of the latch bolt shall not be less than 2.5 N.

9.3.2.3 *Torque to withdraw the latch bolt with key*

With a suitable torque gauge and adaptor, the latch bolt shall be withdrawn until the leading edge of the bolt head is flush with the forend, during which movement, the torque M1 shall not exceed 5Nm. (*see* Fig. 1)

9.3.2.4 *Torque to withdraw the latch bolt with handle*

On application of torque M2 using suitable torque gauge and adaptor, latch bolt shall be withdrawn and should not project more than 1 mm from leading edge of door. M2 shall not exceed 5 Nm.

9.3.2.5 *Strength of normal latch action and stops*

Using a suitable torque gauge and adapter, a torque M4 shall be applied without shock to the follower in a time of 5s ± 2s, in both clockwise and anticlockwise directions; the latch bolt components shall resist a torque of 5 Nm. The latch action shall function correctly after this test, fulfilling the requirements of **9.3.2.3**.

9.3.2.6 *Resistance to side load on latchbolt*

The lock or the latch shall be mounted as shown in Fig. 11a) or Fig. 11b) using metal thread screw of equivalent strength to the fixing means supplied/recommended by the manufacturer. The choice to use either Fig. 11a) or Fig. 11b) method for mounting should be determined by the manufacturer. A force F1 shall be applied to the securing face of the latch bolt, 3 mm ± 0.2 mm from the forend. Force applied by a tool according to Fig. 11c). The latch bolt should withstand load F1 as per Table 5. The latch action shall not be affected as a result of this test. The tests as given in **9.3.1.2** and **9.3.1.3** shall be repeated as per the frequency given below:

a) *Grade 1* — Every 12 months;
b) *Grade 2* — Every 6 months; and
c) *Grade 3* — Every 3 months.

NOTE — The repeat tests are not applicable for euro/oval profile cylinder bodies.

9.3.3 *Tests for locking plate of Mortise Lock*

9.3.3.1 *Resistance to side load on locking plate*

The locking plate shall be mounted in a suitable test apparatus using metal thread screw of equivalent strength to the fixings supplied/recommended by the manufacturer as shown in Fig. 14 or as defined by the manufacturer, side load F4 applied to the bolt aperture for a period of 60 s + 10 s, using a tool which represents the deadbolt of an appropriate lock or latch. The locking plate should withstand load F4 as per Table 5.

9.3.3.2 *Resistance to pulling on locking plate*

The locking plate shall be mounted in a suitable test apparatus using metal thread screws of equivalent strength to the fixings supplied/recommended by the manufacturer as shown in Fig. 15 and a pull load F6 applied to the bolt aperture for a period of 60s + 10 s, using a tool representing the hook/claw bolt of an appropriate lock. The locking plate should withstand load F6 as per Table 5.

9.3.3.3 *Resistance to lifting force on locking plate*

The locking plate shall be mounted in a suitable test apparatus using metal thread screws of equivalent strength to the fixings supplied/recommended by the manufacturer as shown in Fig. 15 and a lifting force F8 applied to the locating device aperture in the locking plate for a period of 60s +10 s, as shown in Fig. 15. The locking plate should withstand load F8 as per Table 5. The tests as given in **9.3.1.2** and **9.3.1.3** shall be repeated as per the frequency given below:

a) Grade 1 — Every 12 months;
b) Grade 2 — Every 6 months; and
c) Grade 3 — Every 3 months.

NOTE — The repeat tests are not applicable for Euro/Oval profile cylinder bodies.

9.3.4 *Tests for Key*

9.3.4.1 *Strength of key*

When tested, the key shall resist a torque of M5 = 2.5 Nm maximum (*see* Fig. 1). The key shall operate the lock correctly after this test and the torque to operate dead bolt and latch bolt shall be less than 1.5 Nm. Again for numbering on key refer Sl No. xix) in Table 5.

9.4 Endurance Test

The finally assembled lock shall withstand the endurance tests given below.

9.4.1 *Durability of Latch Action*

9.4.1.1 *Durability of latch bolt with follower and handle*

9.4.1.1.1 The lock or latch shall be mounted with the forend on a test door, together with a representative

Table 5 Summary of Testing

(*Clauses* 9.3.1.2, 9.3.1.3, 9.3.1.4, 9.3.1.5, 9.3.1.6, 9.3.2.6, 9.3.3.1, 9.3.3.2, 9.3.3.3 *and* 9.3.4.1)

Sl No.	**Sub Clause Number**	**Requirements**	**Test Para**	**Grade**			**Unit**	**Min/Max**
				1	2	3		
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
i)	9.3.1.1	Torque to operate deadbolt with key	M3	1.5	1.5	1.5	Nm	Max
ii)	9.3.1.2	Resistance to side load on deadbolt	F4	2	3	5	kN	Min
iii)	9.3.1.3	Resistance to end load on deadbolt	F5	1	2	3	kN	Min
		Deadbolt projection	L1	10	12	20	mm	Min
		Resulting deadbolt projection	L2	8	10	17	mm	Min
iv)	9.3.1.4	Resistance to pulling of hook/claw bolt	F6	0.5	1	1.5	kN	Min
v)	9.3.1.5	Resistance to disengaging of hook/claw bolt	F7	0.5[a]	1[a]	1.5[a]	kN	Min
vi)	9.3.1.6	Resistance to forcing of locating device in sliding door locks	F8	0.5	1	1.5	kN	Min
viii)	9.3.2.2	Return force of latch bolt	F2	2.5	2.5	2.5	N	Min
ix)	9.3.2.3	Torque to withdraw the latch bolt with key	M1	5	5	5	Nm	Max
x)	9.3.2.4	Torque to withdraw the latch bolt with handle	M2	5	5	5	Nm	Max
xi)	9.3.2.5	Strength of normal latch action and stops	M4	5	5	5	Nm	Max
xii)	9.3.2.6	Resistance to side load on latch bolt	F1	0.5	1	1.5	kN	Min
xiv)	9.3.3.1	Resistance to side load on locking plate	F4	1	2	3	kN	Min
xv)	9.3.3.2	Resistance to pulling on locking plate	F6	1	2	3	kN	Min
xvi)	9.3.3.3	Resistance to lifting force on locking plate	F8	1	2	3	kN	Min
xviii)	9.3.4.1	Strength of key	M5	2.5	2.5	2.5	Nm	Min
xix)	–	Number on Key	–	Direct coding allowed	Direct coding allowed	Direct coding not allowed	–	–
xx)	9.4.1.1	Durability of latch bolt with follower and handle	–	100 000	200 000	200 000	–	–
xxi)	9.4.1.2	Durability of latch bolt with rotary arm	–	100 000	200 000	200 000	–	–
xxiii)	9.4.2	Durability of deadbolt mechanism	–	50 000	50 000	50 000	–	–
xxiv)	9.4.2	Durability of dead bolt automatically locking	–	50 000	75 000	100 000	–	–
xxv)	9.4.3	Durability of locking snib mechanism	–	20 000	30 000	50 000	–	–
xxvi)	9.5.1	Corrosion resistance	–	24	48	96	h	–
xxvii)	9.5.2	Operation at extremes of temperature	–	+ 80 °C or –20 °C	+ 80 °C or –20 °C	+80 °C or –20 °C	^{0}C	–

[a] Where the deadbolt is protected by a box locking plate the end load on deadbolt requirement shall be 0.5 kN. All deadbolt having more than 15 mm projection should have minimum 3 mm less resulting projection.

set of lever handle. Depress the latch bolt to within 1 mm of the forend by handle and release it by means of suitable mechanism as shown in Fig. 16. Each complete test cycle shall consist of the following:

a) Rotate lever handle to fully withdraw latch bolt within 1 mm of the forend with 4 Kg mass attached to handle 50mm from center of handle; and
b) Allow handle to return to 'at rest' position.

9.4.1.1.2 Operation speed shall be 30 cycles per minute maximum. At the end of the test the components should not show any undue movement from their normal position to cause impediment to the smooth working of the mechanism. The latch bolt should withstand number of cycles as per Table 6.

9.4.1.2 *Durability of Latch bolt with rotary arm*

The lock or latch shall be mounted with the forend vertical. Depress the latch bolt to within 1 mm of the forend and release it by means of rotary arm having profile as shown in Fig. 17. Rotate the rotary arm at 60 rotation/min maximum. At the end of the test the components should not show any undue movement from their normal position to cause impediment to the smooth working of the mechanism. The latch bolt should withstand number of cycles as per Table 6.

9.4.2 *Durability of Deadbolt Mechanism*

9.4.2.1 The lock shall be mounted with its forend vertical. The test apparatus shall be capable of key rotation, and of inserting and withdrawing the key from the lock. Where it is possible to determine which is the outward facing side of the lock, the key shall be inserted from this side.

9.4.2.2 Each complete test cycle shall be as follows:

a) Insert key into lock;
b) Rotate key sufficiently to fully throw and detain deadbolt;
c) Withdraw the key from lock;
d) Re-insert key into lock, and rotate to fully withdraw deadbolt with latch bolt wherever applicable; and
e) Withdraw the key from lock.

9.4.2.3 Where the deadbolt is in the form of a sprung bolt (auto deadbolt) that can only be withdrawn by the dead locking bolt, the above test cycle shall be modified as follows:

a) Insert key into lock;
b) Rotate key sufficiently to fully withdraw deadbolt with latch bolt wherever applicable;
c) Withdraw key from lock; and
d) Press dead locking bolt to fully throw deadbolt.

9.4.2.4 This test shall be conducted with one key only. If the key operates both deadbolt(s) and latch bolt(s) the test cycle shall include the complete bolt throwing action. In the withdrawn position, the key may remain in the key guide, providing that it is not in contact with the detaining elements (levers, pins, etc). Where the lock is designed to be used in conjunction with a cylinder, the test apparatus shall be required only to fully throw and withdraw the deadbolt (or fully withdraw/release the latch bolt, where this provides the security), operating the bolt of the lock via a simulated cylinder without taking the "cylinder key" in and out. Operation speed shall be up to maximum 6 cycles per minute. Each cycle should be within 10 s to 12 s. The deadbolt mechanism should withstand number of cycles as per Table 6.

9.4.3 *Durability of Locking Snib Mechanism*

9.4.3.1 The lock or latch shall be mounted on a suitable fixture providing either a sliding or partial rotary action depending upon the design of the snib mechanism. One test cycle shall consist of moving the snib from unlocked position to locked position and back to unlocked. The locking snib mechanism should withstand number of cycles as per Table 6.

Table 6 Durability Requirements

(*Clauses* 9.4.1.1.2, 9.4.1.2, 9.4.2.4 *and* 9.4.3.1)

Sl No.	Sub Clause Number	Durability	Number of Cycles Requirements		
			Grade 1	Grade 2	Grade 3
(1)	(2)	(3)	(4)	(5)	(6)
i)	**9.4.1.1**	Latch bolt with follower and handle	100 000	200 000	200 000
ii)	**9.4.1.2**	Latch bolt with rotary arm	100 000	200 000	200 000
iii)	**9.4.2**	Deadbolt manually locking	50 000	50 000	50 000
iv)	**9.4.2**	Deadbolt automatically locking	50 000	75 000	100 000
v)	**9.4.3**	Snib mechanism	20 000	30 000	50 000

Above tests as given in **9.4** shall be repeated as per the frequency given below:

a) Grade 1 — Every 12 months;
b) Grade 2 — Every 6 months; and
c) Grade 3 — Every 3 months

NOTE — The repeat tests are not applicable for Euro/Oval profile cylinder bodies.

9.5 Corrosion Resistance and Temperature

9.5.1 *Corrosion Resistance*

9.5.1.1 The lock or latch, shall be mounted in a fixture similar to a door application and subjected to a neutral salt spray test, as detailed in IS 9844 to determine their ability to operate after environmental exposure. The duration of the test being dependent on the grading number as follows:

a) Grade 1 — 24 h — low corrosion resistance.
b) Grade 2 — 48 h — moderate corrosion resistance.
c) Grade 3 — 96 h — high corrosion resistance.

9.5.1.2 The lock shall be operated once every 24 h during the test.

9.5.1.3 Immediately following the neutral salt spray test, and cleaning of the lock, the lock shall be subjected to the tests **9.3.1.1, 9.3.2.3** and **9.3.2.4**. The lock or latch shall be operated 20 times. The opening torque shall be measured and recorded during final three cycles. The torque to operate the deadbolt shall not exceed 1.5 Nm, neither shall the torque on the follower (where applicable) exceed requirements in **9.3.2.3** and **9.3.2.4**, as appropriate, by more than 20 percent.

9.5.2 *Operation at Extremes of Temperature*

The lock shall be stabilized before test by subjecting it to constant temperature of 20 °C ± 5 °C and a relative humidity of 60 ± 5 percent for a period of at least 1 h. The key shall be kept separately at normal room temperature during the tests. The lock shall be heated/cooled at the minimum rate of 10 °C ± 10 percent per hour until the required temperature of + 80 °C or –20 °C is reached. The lock/latch shall be subjected to the tests at **9.3.1.1**, **9.3.2.3** and **9.3.2.4**. The lock/latch shall pass these tests. Operating torques are recorded, in the interval of the last 20 min of stabilizing time.

10 INSPECTION AND CERTIFICATE OF COMPLIANCE

10.1 The purchaser or his representative shall be permitted to inspect locks in open condition before purchasing, if he so desires.

10.2 Each manufacturer shall furnish on request a certificate stating that the mortise locks comply with the requirements of this standard.

11 MARKING

11.1 The keys shall be stamped on the head with the serial number of the lock. Each mortise lock shall be stamped with the following information:

a) Manufacturer's name or trade-mark;
b) Year of supply (if specified by the purchaser);
c) Size of mortise lock;
d) Grade of lock;
e) Number of detaining elements (levers); and
f) Country of origin.

11.2 Each cardboard box shall be marked with the following information:

a) Manufacturer's name or trade-mark;
b) Type of locking mechanisms;
c) Size of lock;
d) Grade of Lock.
e) Quantity in the package; and
f) Country of origin.

11.3 BIS Certification Marking

The product(s) conforming to the requirements of this standard may be certified as per the conformity assessment schemes under the provisions of the *Bureau of Indian Standards Act,* 2016 and the Rules and Regulations framed thereunder, and the product(s) may be marked with the Standard Mark.

12 PACKING

12.1 Each lock and latch, along with keys, shall be suitably packed as per agreement to between the purchaser and the manufacturer.

12.2 Each carton may contain 25 or in multiples of 25 locks and no key shall be interchangeable in the box of 25 locks.

13 SAMPLING

Sampling and inspection of a consignment of locks shall be carried out in accordance with the provisions laid down in Annex C.

ANNEX A

(*Foreword*)

INFORMATION TO BE SUPPLIED BY THE PURCHASER WHEN PLACING AN ORDER FOR SUPPLY OF MORTISE LOCKS

A-1 INFORMATION TO BE SUPPLIED

The purchaser shall furnish information to the manufacturer or the supplier in regard to the following points:

a) Whether the door is single shutter with rebated or straight ends, opening inside or outside hinged on the right or left (of a person facing the door when standing outside the room);

b) Whether the door is double shutter with rebated or straight ends right or left overlaps the other (of a person facing the door when standing outside the room);

c) Width of a stile if any;

d) Width of horizontal lock rail, if any;

e) Thickness of stile, lock rail, if provided, or thickness of shutter itself;

f) Depth of rebate; and

g) Angle of rebate.

NOTE — All locks are usually fitted to the overlapping shutter.

ANNEX B

(*Clause* 9.1.2)

ILLUSTRATION OF TEST APPARATUS FOR LOCKS AND LATCHES

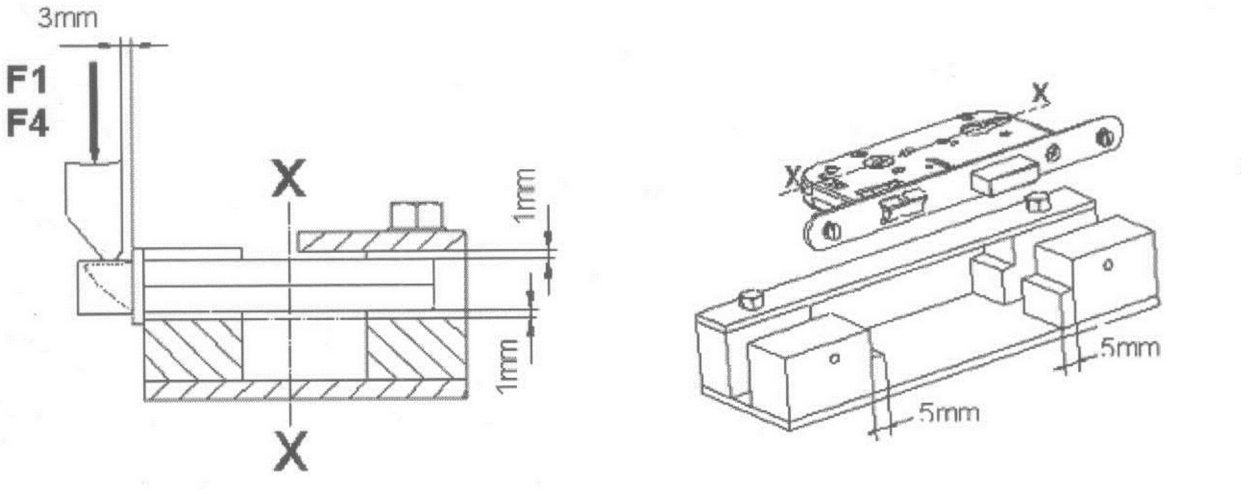
B-1 Illustration show typical examples of lock test-rig construction or design. Where specifically stated in manufacturer's instructions for the product, alternative materials, additional support, etc as appropriate, may be used. The distance between door and frame should be 3mm ± 1 mm. The minimum thickness of the test block shall be 44 mm ± 1 mm.

NOTES

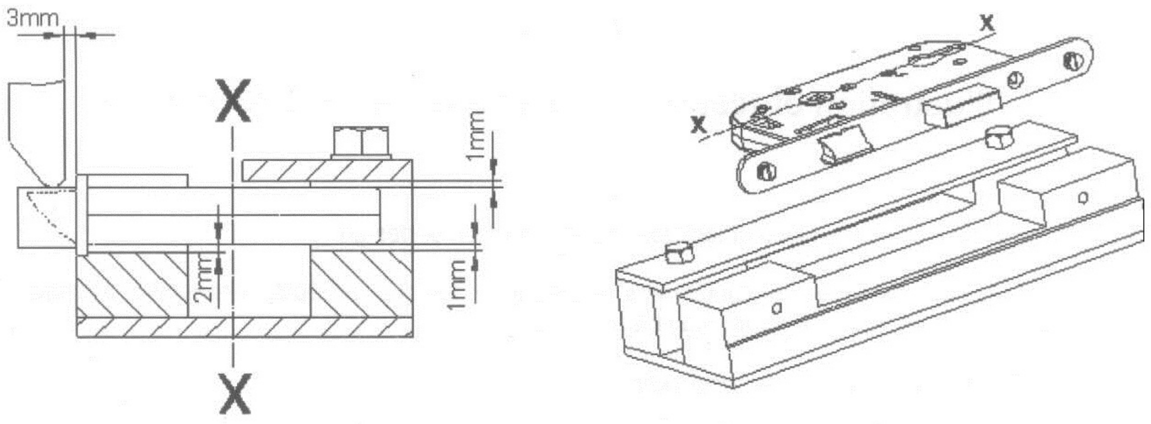
1 Test fixtures are shown in principle only.

2 If the lock case width requires a thicker test block the thickness should be calculated with the formula:

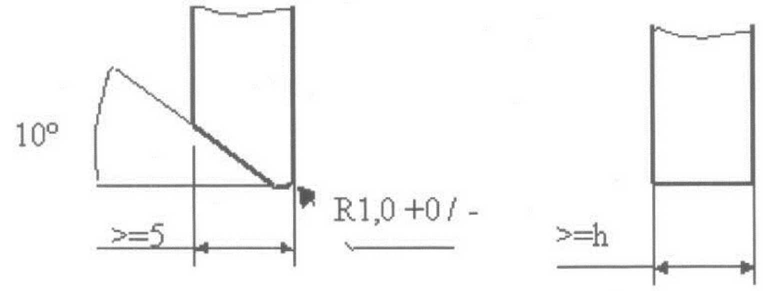
$B = 2.5 \times b$ Where 'b' = the thickness of the lock case, and 'B' = the thickness of the test block.



A) Forend Not Supported in the Fixture



B) Forend Supported in the Fixture

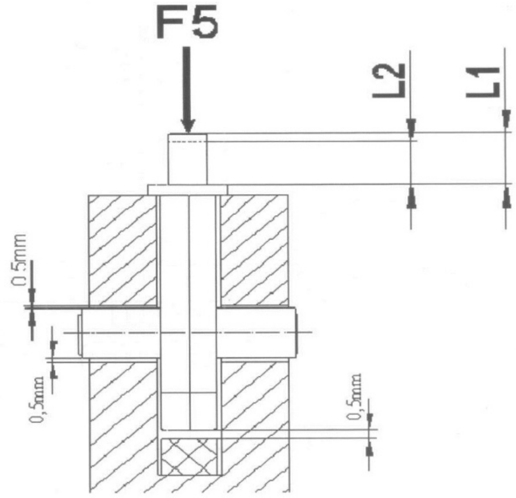


Key

h Height of deadbolt

C) Shape of Tool

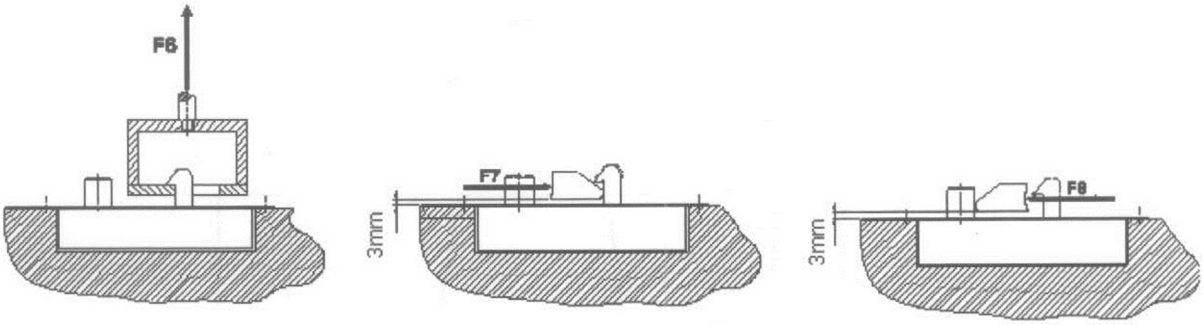
Fig. 11 Side Load on Latch Bolt and Deadbolt Resistance Test



Key

A Support of the lockcase if specified by the manufactures instructions

Fig. 12 End Load Test and Deadbolt Projection



A) RESISTANCE TO PULLING TEST

B) RESISTANCE TO DESENGAGING TEST

C) RESISTANCE TO FORCING OF LOCATIONG DEVICE TEST

FIG. 13 RESISTANCE TEST ON HOOK/CLAW BOLT LOCKS

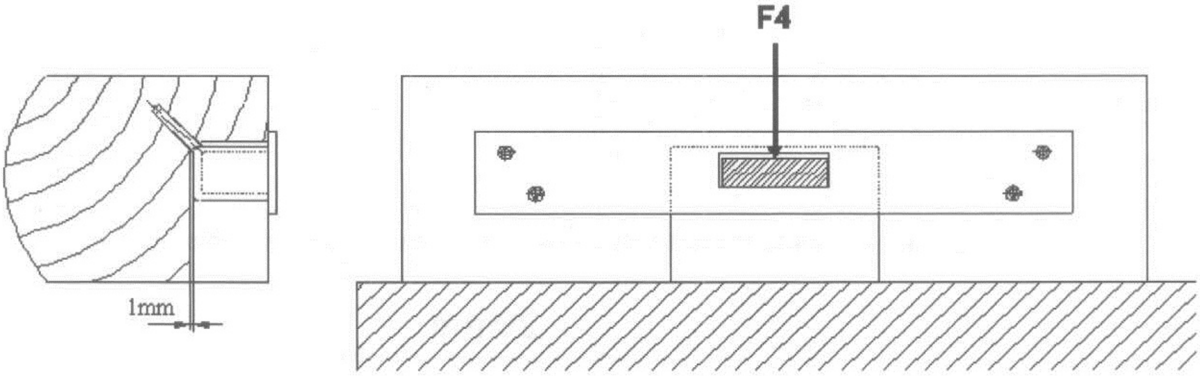


FIG. 14 SIDE LOAD TEST ON LOCKING PLATE

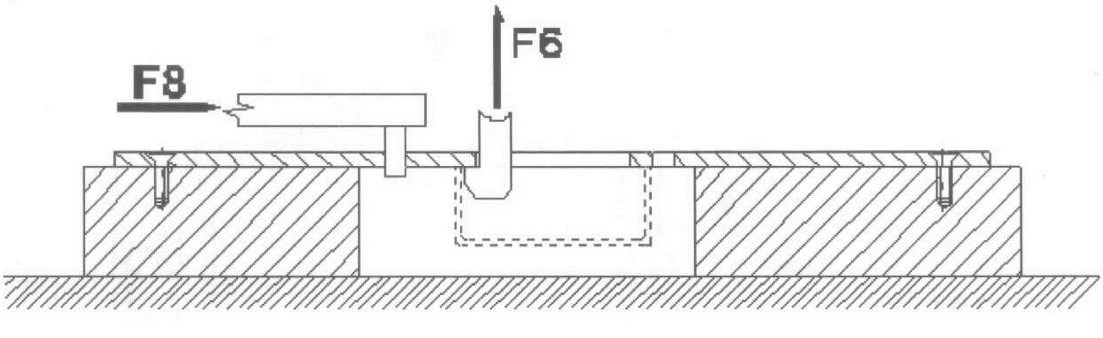


FIG. 15 PULL AND LIFTING LOAD TEST

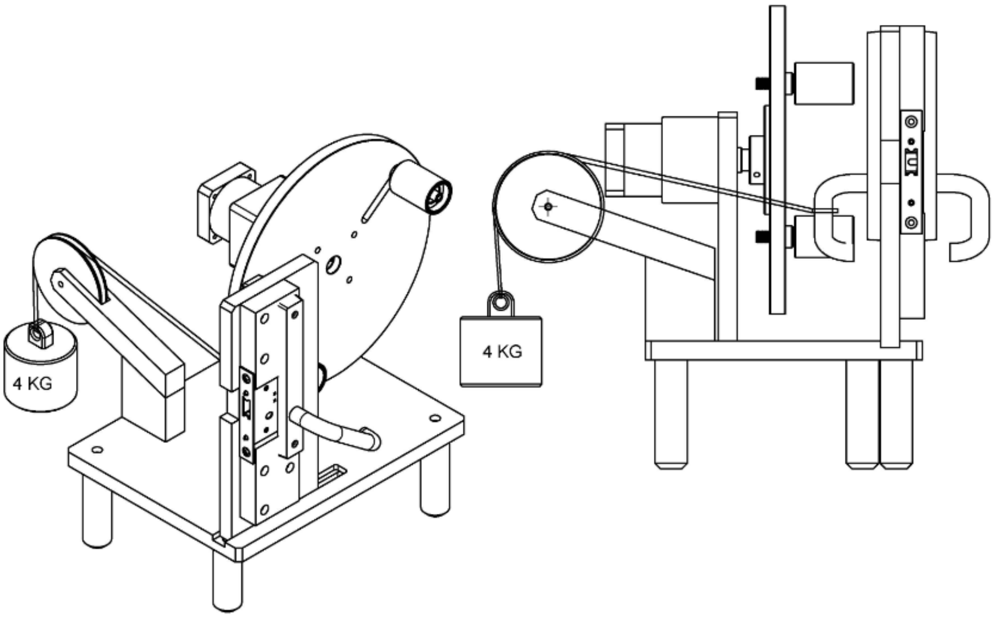
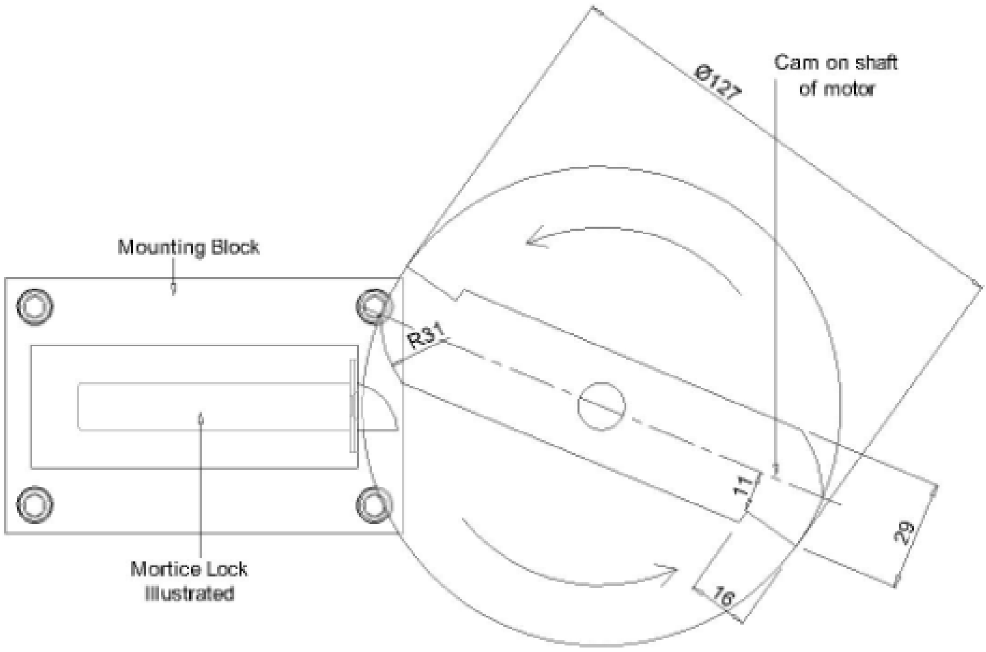
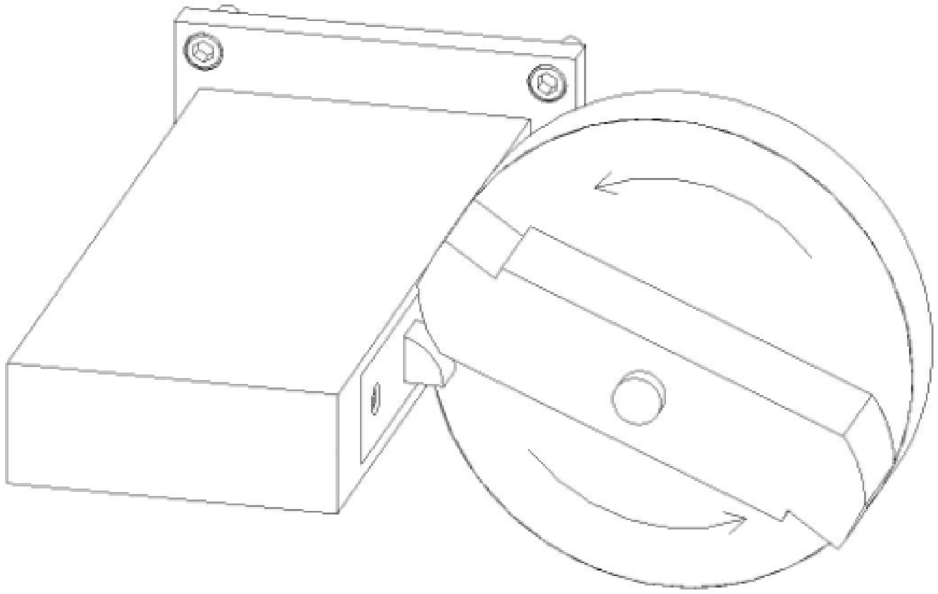


FIG. 16 DURABILITY OF LATCH BOLT WITH FOLLOWER AND HANDLE



PLAN VIEW

All Dimensions are in millimeters



ISOMETRIC VIEW

FIG. 17 DURABILITY OF LATCH BOLT WITH ROTARY ARM

ANNEX C

(*Clause* 13)

SAMPLING AND CRITERIA FOR CONFORMITY

C-1 LOT

C-1.1 In any consignment all the locks of the same size and grade shall constitute a lot. This shall be ascertained by carrying out a general visual inspection of the consignment to check that the lot is of the same type and size and appears to be homogenous in regard to origin source of production period of manufacture and any other visual ascertainable characteristics in case the consignment does not appear to be homogenous within itself and treated as a separate group each group being homogeneous within itself and treated as a separate lot for the purpose of sampling.

C-1.2 Number of locks to be selected at random from a lot shall depend upon the size of the lot and shall be in accordance with col 2 and 3 of Table 7.

C-1.3 Locks for the sample shall be selected at a random from at least 10 percent of the packages subject to a minimum of three packages, equal number of locks being selected from each such packages.

C-2 CRITERIA FOR CONFORMITY

C-2.1 The locks selected according to **C-1.3** shall be inspected for conformity to dimensions workmanship and finish manufacturing details and testing for smooth working. The lot shall be considered as conforming to these requirements, if the number of locks failing in any one or more of the requirements does not exceed the permissible number of defectives given in col 4 of Table 7.

Table 7 Scale of Sampling and Permissible Number of Defective Locks

(*Clauses* C-1.2 *and* C-2.1)

Sl No. (1)	Lot Size (2)	Sample Size (3)	Permissible Number of Defectives (4)
i)	Up to 200	15	0
ii)	201-300	20	1
iii)	301-500	30	2
iv)	501-800	40	2
v)	801 and above	50	3

ANNEX D

(*Foreword*)

COMMITTEE COMPOSITION

Utensils, Cutlery Domestic Hardware Sectional Committee, MED 33

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Amendments Issued Since Publication

Amend No.	Date of Issue	Text Affected

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